

Appln. No. 10/673,615
Response B dated October 7, 2005
Reply to Office Action of July 7, 2005

Amendment to the Drawings:

At the request of the Examiner, a new set of drawings is submitted herewith, such drawings having been prepared by a draftsman incorporating previous amendments and presenting the drawings in a clearer fashion.

Attachment: Replacement Sheet(s)

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REMARKS/ARGUMENTS

Amendments

Amendments have been made to the specified paragraphs in the specification for minor typographical errors.

Claims 1 and 21 are amended to define that the surfaces to be bonded are low energy surfaces. Support for this can be found on page 4, lines 4-13. Claims 1, 21 and 30 are amended to indicate that all low energy surfaces are untreated. Furthermore, the claims are further amended to indicate that the adhesive used does not require that the surfaces be treated. Support for this amendment can be found on page 2, lines 23-28, page 7, lines 23-24 and page 13, lines 1-4. Claim 1 is further amended to indicate that the "cured adhesive" has a lap shear strength of 400 psi or greater. Support for this amendment can be found on page 13, lines 22-28.

35 USC§103(a) Rejection 1

Claims 1-15 and 29 and 39 are rejected under 35 USC§103(a) as being unpatentable over Wood et al., U.S. Patent 5,928,745, hereinafter referred to as Wood in view of Zharov et al., U.S. Patent 5,539,070, hereinafter referred to as Zharov. Applicants traverse this rejection for the reasons stated hereinafter and respectfully request withdrawal of the rejection.

Argument 35 USC§103(a) Rejection 1

The primary reference Wood relates to technology to improve the barrier properties of plastic which can be used in fabricating fuel tanks. The primary focus of Wood is the nature of the cyclodextrin added to the plastic to improve its fuel barrier properties. The materials modified with the cyclodextrin include a variety of thermoplastics and such materials include high density polyethylene which is a low surface energy material. Wood discloses at column 3, lines 51-55 that "the fuel tank can be prepared by joining half tank sections at a joining edge and sealing the tank using thermal welding, hot melt adhesives, thermosetting (e.g., epoxy or urethane) adhesives, flange clamps or other known sealing technology." See also column 7, lines 57-63 which discloses that joining of fuel tank halves can be accomplished using

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thermal or heat welding, adhesives (both thermoplastic and thermosetting), mechanical clamps or other joinery, etc.

What Wood does not teach is bonding the fuel tank parts together or bonding parts onto a fuel tank wherein the surfaces to be bonded together are low energy surfaces, that the low energy surfaces can be untreated and that the adhesive utilized must have a lap shear strength of about 400 psi or greater. Further, Wood does not disclose that the adhesive can support a load of 1,340 Newtons (Claim 5) or the adhesive has a fuel vapor permeation rate of not more than 46 grams per millimeter/meter²/day (Claim 6). Nor does Wood teach that the adhesive can comprise an amine organoborane complex as required according to Claim 7. Therefore, the primary reference Wood contains insufficient teaching to establish a case of *prima facie* obviousness.

Therefore, the Official Action cites as a secondary reference Zharov. In order to properly combine the teachings of two or more references, the Official Action must clearly indicate where in the prior art there is (1) a motivation for the combination, and (2) an expectation that the substitution of teachings of the secondary reference into the primary reference would result in a structure which would perform as expected, that is, that there is an expectation that the proposed modification would be successful. The Official Action does not provide a description in the prior art which provides such motivation or which provides an indication that if the modification were made the resulting structure would be successful in performing as expected.

Zharov discloses amine organoborane complex initiated adhesives and that such adhesives bond to low energy surfaces. The Examiner is respectfully requested to point out where in the cited references there is any suggestion that the adhesives as disclosed in Zharov could be used to bond fuel tanks together. Applicants submit there is no such teaching and absent such teaching, this combination is improper and can not be used to establish a case of *prima facie* obviousness. The Applicants' specification is the only place where the disclosure of using adhesives as disclosed in Zharov in assembling a fuel tank or assembling parts

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to a fuel tank is found. The teaching of the specification cannot be used as the basis for motivation to combine references.

The analysis of motivation to modify the teachings of a primary reference can not be performed in a vacuum and must be performed in view of the state of the prior art at the time the invention was filed. First, it is well known that in commercial practice today, all fuel tanks are bonded together using vibration welding or hot plate welding and not adhesives. See the specification at page 1, line 26 to page 2, line 2. See, the Declaration of Toni Ristoski, enclosed herewith describing the state of the art. Furthermore, it is known that the standard adhesives which are disclosed in Wood of epoxies and polyurethanes do not bond to low energy surfaces. It is disclosed in several references that a variety of treatments can be performed on low energy surfaces to modify the energy or wetting ability of that surface to make it a higher energy surface to allow such surface to accept the adhesives such as epoxies and polyurethanes. See *Adhesives Age*, October 1996, pages 38-44 (enclosed herewith). See also the following U.S. patents. Schaetzle, U.S. Patent 5,976,291 at column 1, lines 21-27 and column 2, lines 58-67; Gutowski et al., U.S. Patent 5,879,757 at column 1, lines 5-65 and column 3, line 66 to column 4, line 4; Matsuda et al., U.S. Patent 5,576,558 at column 1, line 14-42 and column 4, lines 21-23; Blow et al., U.S. Patent 5,307,428 at column 1, line 20 to column 2, line 40 and Simpson et al., U.S. Patent 5,132,172 at column 1, line 18 to column 2, line 39; Birnbrich et al., U.S. Patent 6,107,406 at column 1, line 6 to column 2, line 43; Bilkadi, U.S. Patent 5,639,546 at column 1, line 20-62 and column 3, line 47-53; and Kunz, U.S. Patent 5,387,449 at column 5, line 45 to column 6, line 30.

Wood discloses the types of adhesives that may be useful for bonding fuel tanks together and those include epoxies, polyurethanes and hot melt adhesives. The reason epoxies and polyurethanes are used is because they provide properties which are needed for the environment of use. The adhesives disclosed in Zharov are not epoxy adhesives, polyurethane adhesives or hot melt adhesives. Therefore, in order for one skilled in the art to substitute adhesives as described in Zharov for those described as useful in Wood, one skilled in the art must have a belief that they are equivalent. No evidence has been presented in the Official Action or in any of the

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cited references that the adhesives as disclosed in Zharov are equivalent to the adhesives disclosed in Wood as being useful for bonding fuel tanks together. Absent this demonstration of equivalence from the prior art, the combination of the references is not supported and there is no motivation to make this substitution.

Neither Wood nor Zharov disclose the adhesive properties necessary for the application. Neither reference discloses that the adhesive demonstrate a lap shear strength of 400 psi or greater as required in Claim 1, nor does it disclose the utilization of an adhesive that can handle loads of 1334 Newtons or greater as required in Claim 5, and it does not disclose the maximum permeation rate as required in Claim 6. There is no disclosure in Zharov as to whether the adhesives disclosed therein would meet these property requirements. Absent the teaching in the prior art or in the references that adhesives to be used for such use require such properties and a teaching in Zharov that the adhesive disclosed in Zharov has such properties, there is no motivation to substitute the adhesives as disclosed in Zharov into Wood. This also demonstrates no expectation of success has been established. At best, the Official Action presents a case for the issue that it is obvious to try the Zharov adhesives in the application. Because there is no discussion in either Wood, Zharov or a third reference which identifies the necessary properties required of the adhesives and that the adhesives of Zharov meets those properties, there can be no expectation of success. Absent this expectation of success as based on evidence, one skilled in the art would not make the substitution and no case of *prima facie* obviousness is made out.

Further, the paper from *Adhesives Age* submitted herewith, makes it very clear that there are significant difficulties in utilizing adhesives to bond to low surface energy materials and that the only way to secure such bonding is by modification of the surface and to change the surface to a higher energy surface. Thus, the adhesives disclosed in Wood do not bond to low energy surfaces, but bond to surfaces modified to change them to higher energy surfaces. This would motivate one skilled in the art away from even trying the suggested substitution.

Furthermore, the Official Action fails to recognize that the standard method used commercially to bond fuel tanks together is thermal welding and

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vibration welding. The question to the Examiner is why would someone utilize an adhesive over what is the present state of the art commercially? It is submitted that this question is not answered and absent properly answering this question, one skilled in the art has no motivation to make the suggested substitution.

Turning now to certain statements made in the Official Action which need to be addressed separately. On page 4, the Official Action states: "Therefore, because Wood et al. teach adhesive bonding of the fuel tanks made of high density polyethylene, Wood et al. inherently teach that the adhesive bonds to low surface material." This is incorrect. The state of the art is that low energy surface materials are treated by a variety of means to change the nature of the surface from a low energy surface to a high energy surface. See the references cited hereinbefore.

At the top of page 5 of the Official Action, it is stated that: "Parts are obviously bonded to walls of fuel tanks using an adhesive." Applicants can find no place in the Wood reference where it teaches that parts are bonded to the fuel tank. Applicants respectfully request that the Examiner answer where in the Wood reference it is disclosed that parts is bonded via adhesive to the fuel tank wall. Furthermore, Straetz et al. cited by the Examiner indicates that fittings are welded to tank halves. See column 3, lines 33-47. Thus, based on the Straetz reference provided in the Official Action, this conclusion is contrary to the teachings of the Straetz reference.

The Official Action at the bottom of page 5 carrying over to page 6 states: "An adhesive with the same composition and make will have the same characteristics including having a lap shear strength of about 400 psi or greater, supporting a load of 1334 Newtons and having a fuel vapor permeation rate of not more than 46 grams/mm²/day." One of ordinary skill in the art would have recognized that amine-organoborane complex containing adhesives are substituted for other adhesives when the adhesive is used to bond low energy surface substrates, such as polyethylene because unlike other known adhesives, the adhesive containing organoborane complex can be bonded effectively to low surface energy materials without the need for costly substrate preparation techniques, as taught by Zharov et al., especially in column 1, lines 18-60 and column 4, lines 1-6." First, the flawed

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logic in this argument is that there is no teaching in Zharov, Wood or any other reference of the recited lap shear strengths, load bearing strengths and fuel vapor permeation rate as a requirement for the adhesive. In order for a proper case of *prima facie* obviousness to have been made out, the prior art must identify the critical properties and identify that an adhesive has the critical properties for the use of the adhesive in the described structure. As discussed before, the prior art does not provide such a teaching. Whether or not adhesives within the scope of the teaching of Zharov have such properties is irrelevant, because there was no identification of such properties needed for this use and there was no identification that the adhesives as described in Zharov have such properties. Because the need for such properties and whether or not the Zharov adhesives have such properties are not identified, there is not motivation to substitute Zharov for the adhesives disclosed in Wood and absent such motivation, there is no case of *prima facie* obviousness made out.

For these reasons, Applicants assert that the rejection of Claims 1-15 and 29 and 39 over the teachings of Wood and Zharov is inappropriate and should be withdrawn because no case of *prima facie* obviousness is established.

35 USC§103(a) Rejection 2

Claims 1-15, 29 and 39 are rejected under 35 USC§103(a) as being unpatentable over Straetz, U.S. Patent 6,454,114, hereinafter Straetz in view of Zharov. Applicants traverse this rejection for the reasons stated hereinafter and respectfully request withdrawal of the rejection.

Argument 35 USC§103 Rejection 2

Straetz discloses a method for producing a plastic fuel tank via blow molding wherein a tank is made as a unitary tank and then cut and reassembled. Straetz discloses that the materials used to blow mold the tanks include polyethylene. It is disclosed at column 2, lines 44-45 that connection of the parts can take place by welding or adhesive bonding. Furthermore, it is disclosed that fittings may be welded to the tank halves. See column 3, lines 33-47.

Straetz does not teach bonding parts of the fuel tank together or bonding parts to a fuel tank wherein the surfaces bonded are untreated low energy

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surfaces or that the adhesive is a low energy surface adhesive. Further, Straetz does not disclose that the cured adhesive provide a lap shear strength of 400 psi or greater, the capability of handling a load of 1334 Newtons (as claimed in Claim 5, a fuel vapor permeation rate as required in Claim 6, or that the adhesive utilized can be an organoborane amine complex initiated adhesive as required by Claim 7. Thus, Straetz alone does not present the case of *prima facie* obviousness.

In order to address the deficiencies and teaching of Straetz, the Official Action cites Zharov for the same reasons it was cited in the previous rejection. Applicants assert that no motivation to combine the teachings is presented based on the lack of citations of teachings in either of the references or a third reference, which would clearly suggests this combination and teach that there is an expectation that the combination would be successful. Applicants further argue that the state of the art would motivate one skilled in the art away from such a combination. First, the Wood reference discloses bonding fuel tanks together and that adhesives named are hot melt adhesives and epoxy or polyurethane adhesives. Secondly, it is well known to those of skill in the art in assembling fuel tanks that fuel tanks are bonded together commercially using hot melt or vibration welding. There is no reference provided in the Official Action which would suggest the use of adhesives comprising organoborane amine complexes or that they can be used for such an application. In order for such an adhesive to be useful in the application, the adhesive must have adequate strength, fuel vapor barrier properties and properties to allow it to hold up under the conditions of use including exposure to hydrocarbons and sufficient strength to hold parts together under high load. There is no teaching or suggestion disclosed in Zharov that the adhesives have such properties. Furthermore, there is no teaching or suggestion in Straetz of the necessary properties needed in the adhesive for bonding fuel tank parts together or parts on a fuel tank. The Official Action states that: "The material disclosed for use in Straetz is a low energy surface material and Zharov discloses bonding low energy surfaces, therefore is motivation to use the Zharov adhesive in the application." This argument ignores that there is no reference which teaches the adhesive properties necessary for such use nor is there is any reference which teaches or suggests that the Zharov adhesives have sufficient properties for such use. In order to have a reasonable expectation of success, there must be a

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reference which suggests that the adhesive selected for use has the appropriate properties for use in bonding fuel tanks together. There is no evidence that such disclosure is available and therefore is no motivation to make this substitution as there is no expectation of success.

Applicants assert that the skilled artisan would look to the art to determine what adhesives have been used in this application and ask to point out before Wood discloses that its epoxy or polyurethane adhesives. The prior art cited by Applicant shows when low energy surface materials are used, the surfaces are modified by treatment so as to adjust the surface energy to allow for bonding using the disclosed adhesives are useful for this application. Therefore, this would motivate one skilled in the art away from substitution of the Zharov adhesives into the teachings of Straetz. For this reason, no case of *prima facie* obviousness is made out and Applicants respectfully request that this rejection be withdrawn.

35 USC§103(a) Rejection 3

Claims 21 and 23-26 are rejected under 35 USC§103(a) as being unpatentable over Wood. Applicants traverse this rejection for the reasons stated hereinafter and respectfully request withdrawal of the rejection.

Argument 35 USC§103(a) Rejection 3

The discussion relative to the first 103 rejection contains all of the necessary arguments relative to this rejection, and Applicants hereby incorporate those arguments into this argument and assert that based on those arguments, no case of *prima facie* obviousness is made out and this rejection must be withdrawn.

Applicants further note that there is no discussion of bonding parts to fuel tanks utilizing an adhesive or the use of redundant seals as in Claim 26. The only discussion of bonding parts to a fuel tank is contained in the Straetz reference which clearly indicates that such parts are bonded via thermal welding or vibration welding.

35 USC§103(a) Rejection 4

Claims 21 and 23-26 are rejected under 35 USC§103(a) as being unpatentable over Straetz. Applicants traverse this rejection for the reasons stated hereinafter and respectfully request withdrawal of this rejection.

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Argument 35 USC§103(a) Rejection 4

The discussion relative to Straetz contain with respect to the 35 USC§103(a) Rejection 2 is relevant here and the reasoning stated in that rejection is hereby incorporated by reference. Applicants further point out that Straetz clearly indicates that parts are bonded to fuel tanks through means of welding techniques and there is no mention of using adhesives for such bonding. For these reasons, this rejection is improper in that no case of *prima facie* obviousness is made out and therefore must be withdrawn.

Argument 35 USC§103(a) Rejections 5 and 6

Relative to the rejections of Claims 27, 28 and 30 over Wood or/and Straetz in view of Yang, U.S. Patent 6,110,544 and/or Chan, U.S. Publication 2002/0172788A1, Applicants hereby assert that the discussions hereinbefore relative to Straetz and/or Wood is applicable and this rejection should be withdrawn for those reasons. Neither Yang nor Chan cure the deficiencies of either primary reference disclosed above.

Applicants assert Claims 1-15, 21, 23-30 and 39 are patentable under 35 USC§103(a) over the cited references for the reasons stated herein and respectfully request early allowance of set claims.

Respectfully submitted,



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